PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2000-272036
(43)Date of publication of application : 03.10.2000

(51)Int.CI. B32B 3/26
B32B 27/18
B32B 27/32
B65D 81/03
C08K 3/22
C08L 23/08
// C08J 5/18
(C08L 23/08
C08L 23:06)
(C08L 23/08
C08L 23:06
C08L 23:28)

(21)Application number : 11-083228
(22)Date of filing : 26.03.1999

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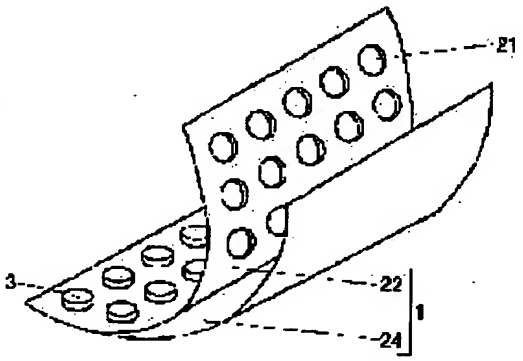
(54) FLAME RETARDANT FOAMING BUFFER SHEET

(57)Abstract:
PROBLEM TO BE SOLVED: To provide a flame retardant foaming buffer sheet having protruded closed cells without using a halogen fire retardant.
SOLUTION: In a foaming buffer sheet 1 having protruded closed cells in which an embossed film 22 in which a lot of embossments 21 are formed and a plane base film 24 are laminated, the embossed film 22 and the base film 24 are a polyethylene composition containing 100 pts.wt. of an ethylene-□-olefin copolymer and 20-150 pts.wt. of a metal hydrate.



LEGAL STATUS

[Date of request for examination] 06.10.2004

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

* NOTICES *

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2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The fire-resistant cellularity buffer sheet characterized by being the polyethylene constituent with which an embossing film and a base film include the range of the (A) ethylene-alpha olefin copolymer 100 weight section, and (B) metal hydrate 20 - the 150 weight sections in the cellular buffer sheet which has the convex closed cell with which the laminating of the embossing film in which much embossing was formed, and the plane base film is carried out.
[Claim 2] The fire-resistant cellularity buffer sheet according to claim 1 with which an embossing film and a base film are further characterized by being a polyethylene constituent including the range of (C) ethylene system copolymer 1 - 80 weight sections.
[Claim 3] The fire-resistant cellularity buffer sheet according to claim 1 to 2 characterized by being the polyethylene constituent with which an embossing film and a base film include further the range of the conversion polyethylene 1 which carried out conversion of the polyethylene with (D) unsaturated carboxylic acid or its derivative - 20 weight sections.
[Claim 4] (A) The fire-resistant cellularity buffer sheet according to claim 1 to 3 characterized by an ethylene-alpha olefin copolymer being a (A) ethylene-alpha olefin copolymer manufactured from the single site catalyst.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the cellular buffer sheet which has the fire retardancy made from plastics which has a convex closed cell.
[0002]
[Problem(s) to be Solved by the Invention] This invention aims at offering the fire-resistant cellularity buffer sheet which has the convex closed cell which does not use a halogen system flame retarder.
[0003]
[Means for Solving the Problem] This invention relates to the fire-resistant cellularity buffer sheet characterized by being the polyethylene constituent with which an embossing film and a base film include the range of the (A) ethylene-alpha olefin copolymer 100 weight section, and (B) metal hydrate 20 - the 150 weight sections in the cellular buffer sheet which has the convex closed cell with which the laminating of the embossing film in which much embossing was formed, and the plane base film is carried out.
[0004] This invention relates to the fire-resistant cellularity buffer sheet with which an embossing film and a base film are characterized by being a polyethylene constituent including the range of (C) ethylene system copolymer 1 - 80 weight sections further preferably.
[0005] This invention relates to the fire-resistant cellularity buffer sheet characterized by being the polyethylene constituent with which an embossing film and a base film include further the range of the conversion polyethylene 1 which carried out conversion of the polyethylene with (D) unsaturated carboxylic acid or its derivative - 20 weight sections preferably.
[0006] This invention relates to the fire-resistant cellularity buffer sheet characterized by a (A) ethylene-alpha olefin copolymer being a (A) ethylene-alpha olefin copolymer manufactured from the single site catalyst preferably.
[0007]
[Embodiment of the Invention] In the cellular buffer sheet which has the convex closed cell with which the laminating of the embossing film with which this invention formed much embossing, and the plane base film is carried out An embossing film and a base film The (A) ethylene-alpha olefin copolymer 100 weight section, (B) -- a metal hydrate -- 20 weight sections -- desirable -- 30 weight sections -- further -- desirable -- 40 weight sections -- They are the 150 weight sections from 50 weight sections, and the 140 weight sections and the fire-resistant cellularity buffer sheet characterized by being the 120 weight sections and the polyethylene constituent which includes the range of the 100 weight sections preferably especially still more preferably preferably especially preferably.
[0008] the fire-resistant cellularity buffer sheet of this invention -- an embossing film and a base film -- further -- the (C) ethylene system copolymer 1 weight section -- further -- 10 weight sections -- especially -- 20 weight sections -- more -- especially -- 80 weight sections from 30 weight sections -- further -- it is desirable that they are 70 weight sections and the polyethylene constituent which includes the range of 60 weight sections especially.
[0009] As for the fire-resistant cellularity buffer sheet of this invention, it is especially desirable

3 weight sections and that they are 15 weight sections and the polyethylene constituent which includes the range of 60 weight sections especially at 20 weight sections from 5 weight sections and a pan to the conversion polyethylene 1 weight section and the pan to which the embossing film and the base film carried out conversion of the polyethylene with (D) unsaturated carboxylic acid or its derivative further.

[0010] (B) A metal hydrate may not have fire retardancy, when smaller than the above-mentioned range, and when larger than the above-mentioned range, it may be difficult for a cellular buffer sheet to fabricate.

[0011] (C) By using the addition of the above-mentioned range, since the film moldability of an ethylene system copolymer of an embossing film and a base film improves, it is desirable. Especially, with inflation film shaping, the melting tension of a polymer improves and the neck in when melting resin comes out of a dice becomes small by film shaping by the T-die method. Moreover, by using the addition of the above-mentioned range, since the receptiveness of (C) ethylene system copolymer of a metal hydrate improves, it is desirable.

[0012] (D) By using the addition of the above-mentioned range, since the adhesion of a metal hydrate and olefin system resin, such as an ethylene-alpha olefin copolymer, and dispersibility are excellent, the conversion polyethylene which carried out conversion of the polyethylene with unsaturated carboxylic acid or its derivative is desirable.

[0013] 21 or more and further 22 or more have [the fire-resistant cellularity buffer sheet of this invention] a desirable oxygen index.

[0014] (B) As a metal hydrate, the inorganic compound which has a hydroxyl group or water of crystallization, such as an aluminum hydroxide, a magnesium hydroxide, basic magnesium carbonate, hydration aluminum silicate, orthosilicic acid aluminum, a hydration magnesium silicate, and a hydrotalcite, is mentioned. The most desirable thing is a magnesium hydroxide, although these metal hydrates may use only one kind and may use it combining two or more kinds. What has the crystal particle diameter of the range of 0.3-1.0 micrometers in these metal hydrates, and does not almost have condensation is desirable. Magnesium-hydroxide system flame-retarder Kuisma 5 (trademark) by consonance chemical-industry incorporated company is one of such things, for example. The grade which performed surface treatment, such as Kuisma 5A, 5B, 5E, and 5J, especially is desirable.

[0015] (C) As an ethylene system copolymer, ethylene system copolymers, such as an ethylene-vinylacetate copolymer, an ethylene acrylic ester copolymer, an ethylene methacrylic ester copolymer, an ethylene acrylic-acid copolymer, an ethylene methacrylic-acid copolymer, and ethylene-propylene rubber, are mentioned. Since ethylene acrylic ester copolymers, such as an ethylene-vinylacetate copolymer and an ethylene ethyl-acrylate copolymer, or those mixture are excellent in thermal resistance among these ethylene system copolymers and the receptiveness of a metal hydrate is excellent, it is desirable, and an ethylene ethyl-acrylate copolymer is the most desirable. In these ethylene system copolymers, especially the thing whose rate of a comonomer is 8 - 30 % of the weight is desirable. Moreover, the range of MI for 0.1-10g / 10 minutes (it measures at load 2.16Kgf and 190 degrees C) is desirable.

[0016] (D) Denaturalize polyethylene with unsaturated carboxylic acid and/or its derivative ("it is called unsaturated carboxylic acid etc. for short" below) as conversion polyethylene which carried out conversion of the polyethylene with unsaturated carboxylic acid or its derivative. In order to denaturalize polyethylene with unsaturated carboxylic acid etc., the approach of melting, kneading can be used for polyethylene, unsaturated carboxylic acid, etc. under existence of peroxide at the temperature beyond the half-life temperature during 1 minute of the peroxide concerned. Moreover, the above-mentioned polyethylene may be made to react with the above-mentioned unsaturated carboxylic acid etc. under existence of inert solvents, such as a hexane, a heptane, benzene, and toluene. As for the rate of peroxide, such as polyethylene and unsaturated carboxylic acid to knead, it is desirable to consider as the 0.01 - 1.0 weight section and the 0.01 - 0.5 weight section respectively to the polyethylene 100 weight section. As polyethylene, super-low density polyethylene (VLDPE), line type low density polyethylene (LLDPE), low density polyethylene (LDPE), medium density polyethylene (MDPE), and/or high density polyethylene (HDPE) are used, for example. The thing of MI of 0.5-10g range for /(it

measures at load 2.16Kgf and 190 degrees C) is desirable. As unsaturated carboxylic acid, a maleic acid, an itaconic acid, and a fumaric acid are used, for example. As an unsaturated-carboxylic-acid derivative, there are maleic-acid monoester, maleic-acid diester, a maleic anhydride, itaconic-acid monoester, itaconic-acid diester, itaconic acid anhydride, fumaric-acid monoester, fumarate diester, etc. As denaturation polyethylene, the polyethylene by which conversion was carried out by the maleic anhydride is desirable.

[0017] (A) The copolymer obtained by copolymerization of ethylene and the alpha olefin of carbon numbers 3-10 can be used for the bottom of existence of the so-called single site catalysts, such as a catalyst (standard law) of the molybdenum oxide supported as an ethylene-alpha olefin copolymer to the catalyst (Philips law) of the chromic oxide supported to the alumina or the silica alumina and the alumina, a Ziegler type catalyst which consists of a transition-metals compound and an organometallic compound, and a metallocene catalyst system, etc. Since it excels in mechanical physical properties, such as melting ductility at the time of shaping, tearing strength of mold goods, and impact strength-proof, and coefficient of friction becomes small, the ethylene-alpha olefin copolymer furthermore manufactured with the so-called single site catalysts, such as a metallocene catalyst system, is desirable.

[0018] As an alpha olefin of the above-mentioned carbon numbers 3-10, a propylene, butene-1, a pentene -1, a hexene -1, 4-methyl pentene -1, octene -1, etc. are mentioned.

[0019] the repeat unit guided from the alpha olefin in the copolymer of the above-mentioned ethylene and an alpha olefin -- usually -- the range not more than 30 mol % -- desirable -- the range not more than 10 mol % -- it is the 0.1-5-mol range of % still more preferably, and is especially contained in [0.1-4 mol] % preferably. Two or more sorts of alpha olefins may be contained even if independent in an ethylene-alpha olefin copolymer.

[0020] as a single site system catalyst -- the [periodic table] -- the combination of the metallocene compound of IV or V group transition metals, and an organoaluminium compound and/or an ionicity compound is used.

[0021] the [periodic-table] -- as IV or V group transition metals, titanium (Ti), a zirconium (Zr), a hafnium (Hf), vanadium (V), etc. are desirable.

[0022] With the metallocene compound, each well-known metallocene compound with which a cyclopentadienyl group makes a ligand that over which the bridge was constructed with the cyclopentadienyl group of a piece, a substituent cyclopentadienyl group, hydrocarbyl silicon, etc. at least, and the thing over which the bridge was constructed by oxygen, nitrogen, and the phosphorus atom can be used further.

[0023] As an example of these metallocene compounds Dimethylsilyl (2, 4-dimethylcyclopentadienyl) (3', 5'-dimethylcyclopentadienyl) zirconium dichloride, Silicon bridge formation mold metallocene compounds, such as dimethylsilyl (2, 4-dimethylcyclopentadienyl) (3', 5'-dimethylcyclopentadienyl) hafnium dichloride, Ethylene bis-indenyl zirconium dichloride, ethylene bis-indenyl hafnium dichloride, Indenyl system bridge formation mold metallocene compounds, such as ethylene screw (methyl indenyl) zirconium dichloride and ethylene screw (methyl indenyl) hafnium dichloride, can be mentioned.

[0024] the shape of a straight chain shown by the general formula and n (-aluminum(R) O-) as an organoaluminium compound used in combination with a metallocene compound by this invention, and an annular polymer (R -- the hydrocarbon group of carbon numbers 1-10 -- it is -- a part -- what was permuted by the halogen atom and/or RO radical is included.) n is polymerization degree and is ten or more preferably five or more -- it is -- the methylalumoxane and ethylalumoxane whose R is methyl, ethyl, and an isobutyl radical as an example, respectively, isobutyl ethylalumoxane, etc. are mentioned.

[0025] Furthermore, as other organoaluminium compounds, trialkylaluminium, dialkyl halogeno aluminum, sesquialkyl halogeno aluminum, alkenyl aluminum, dialkyl hydro aluminum, sesquialkyl hydro aluminum, etc. are mentioned.

[0026] As an ionicity compound, it is shown by general formula and C+-A-, and it is Broensted acid which consists of the cation or Lewis base, and proton of the oxidizing quality of an organic compound, an organometallic compound, or an inorganic compound, and C+ can react with the anion of a metallocene ligand and can generate the cation of a metallocene. As those examples,

what was indicated by JP,4-253711,A, the 4-305585 official report, the Patent Publication table Taira No. 507756 [five to] official report, and the 5-502906 official report can be used.
[0027] Especially, an ion compound with a tetrakis (pentafluorophenyl) borate anion, a triphenyl carbonium cation, or a dialkyl anilinium cation is desirable. These ion compounds can be used together with the aforementioned organoaluminium compound.
[0028] As the copolymerization approach of the ethylene by the single site system catalyst, various kinds of approaches learned well can be adopted, and the fluidized bed vapor phase polymerization in the inside of inert gas or a stirring type vapor phase polymerization, the slurry polymerization in the inside of an inert solvent, the bulk polymerization that uses a monomer as a solvent are mentioned.
[0029] (A) As an ethylene-alpha olefin copolymer, it is desirable to have the following properties. A consistency (d) as a lower limit (A-1) 0.880 (g/cm3), further 0.890 (g/cm3) -- especially -- as the upper limit from 0.900 (g/cm3) -- 0.960 (g/cm3) -- further 0.950 (g/cm3) -- especially the range (A-2) of 190 degrees C of 0.940 (g/cm3) the melt flow rate (MI) in 2.16kg load -- as a lower limit -- 0.5g / 10 minutes, and further 1 (g / 10 minutes) -- especially -- as the upper limit from 2 (g / 10 minutes) -- 20 (g / 10 minutes) and further 10 (g / 10 minutes) -- especially -- the range [0030] of 7 (g / 10 minutes) (A) In the above-mentioned consistency range, without being too hard, without being too soft, since moderate hardness is obtained, an ethylene-alpha olefin copolymer is desirable. (A) Since a making machine does not become an overload at the time of film shaping and the film moldability is excellent in inflation shaping or T-die shaping in the above-mentioned melt flow rate range, an ethylene-alpha olefin copolymer is desirable in it.
[0031] the above-mentioned polyethylene constituent -- each component -- various kneading machines, such as a Banbury mixer, a roll mixer, a kneader, a high-speed rotation mixer, and an extruder, -- preferably, using a monopodium or a biaxial extruder, it is mixable, and can knead and can obtain. Moreover, it can also knead at the time of a film inflation or T-die fabrication. Moreover, it is also mixable with a solution blend using a suitable good solvent.
[0032] The above-mentioned polyethylene constituent responds to an application. A higher fatty acid, a high-class aliphatic series amide, Lubricant, such as metal soap and glycerol ester, a natural silica, a synthetic silica, Anti blocking agents, such as talc and diatomaceous earth, a phenol system, a **** system, Ultraviolet ray absorbents, such as anti-oxidants, such as BHT, a benzophenone, benzotriazol, and HALS, Pigments, such as inorganic and organic bulking agents, such as a silica, a calcium carbonate, a mica, and carbon black, an azo system, a phthalocyanine system, the Quinacridone system, an iron oxide, and ultramarine blue, an antistatic agent, a surfactant, etc. can be added.
[0033] The cellular buffer sheet of this invention is a cellular buffer sheet which has many convex closed cells with which the laminating of the embossing film in which much embossing was formed, and the plane base film is carried out. The embossing film in which much convex projections were formed on the whole surface For example, plane base film and lamination, 3 layer structures which stuck the plane top film on the thing in which air bubbles were formed to the interior of the convex projection of an embossing film, and the top face of a convex projection of this cellular buffer sheet are sufficient. After forming many air bubbles by sticking an embossing film by approaches, such as heat welding with a base film, the air omission of air bubbles does not happen.
[0034] The cellular buffer sheet of this invention to the field of one side of an embossing film, the stuck base film, and a top film, or both Kraft paper, The sheet made of paper containing elongation papers, such as corrugated paper, paper of fine quality, a liner, or crepe paper; Metallic foil; polyimide, such as aluminum foil Polyolefines, polyamides, polysulfones, and polyester Thermoplastics films, such as a polyvinyl chloride and a polyvinylidene chloride; A glass fiber, The nonwoven fabric of inorganic [, such as aromatic polyamide fiber,] or the product made from organic fiber; A glass fiber, The sheet made from plastics strengthened with the carbon fiber etc.; Glass, silicon carbide, textile-fabrics [of inorganic fibers, such as a nitriding silicon,]; -- textile-fabrics [made from organic fiber, such as aromatic polyamide fiber,]; -- textile-fabrics [made from fiber reinforced plastics, such as a glass fiber and a carbon fiber,]; and these laminating sheets are stuck, and can be used. A binder layer is stuck on the field of

one side of an embossing film, the stuck base film, and a top film, or both, and the cellular buffer sheet of this invention can use it for it.
[0035] Below, the gestalt of operation of this invention is explained in detail per drawing. This invention is not limited only to the gestalt of these operations.
[0036] An example of the concrete structure of the fire-resistant cellularity buffer sheet of this invention is explained using a drawing. Drawing 1 is the explanatory view of the fire-resistant cellularity buffer sheet 1 of this invention. With the fire-resistant cellularity buffer sheet 1, the embossing film 22 and a base film 24 carry out a laminating, and are stuck.
[0037] the embossing film 22 has much projections or embossing 21, and this projection 21 shows it to drawing 1 -- as -- ********** -- things are desirable. At drawing 1 , although this projection 21 is regularly arranged in the shape of a grid, there is no limit in arrangement of projection 21. Although the embossing film 22 has the field of the side which projection 21 projects, and the field of the side which the projection 21 has not projected, it sticks a base film 24 on the field of the side which the projection 21 has not projected. Thereby, projection 21 forms the cellular section 3 with a base film 24, and this cellular section has buffer action.
[0038] Drawing 2 is the explanatory view of another fire-resistant cellularity buffer sheet 7 of this invention. With the buffer sheet 7, the top film 23, the embossing film 22, and a base film 24 carry out a laminating to this sequence, and are stuck. In this embodiment, it has the structure where the top film 23 was further stuck on the buffer sheet 1 of drawing 1 in the field of the side which the projection 21 of the embossing film 22 projects. That is, the top film 23 and a base film 24 are stuck on both sides of the embossing film 22. The cellular section 3 which projection 21 and a base film 24 form not only has buffer action, but with the buffer sheet 7, the space of the outside of projection 21 inserted into the embossing film 22 and the top film 23 has buffer action.

[0039] The thickness of an embossing film the thickness of the convex closed cell section (embossing) 3 Especially the range especially of 55 micrometers is desirable [15 micrometers / from 20 micrometers] as a lower limit 60 more micrometers 80 micrometers as a upper limit 18 more micrometers. The thickness of the seal section 2 (except the embossing section) Especially the range especially of 130 micrometers is desirable [50 micrometers / from 70 micrometers] as a lower limit 150 more micrometers 200 micrometers as a upper limit 60 more micrometers. The range of 70 micrometers is usually desirable [especially the film thickness especially of a base film / 15 micrometers / from 20 micrometers] as a lower limit 80 more micrometers 100 micrometers as a upper limit 18 more micrometers.
[0040] The film fabricated by any of a tubular film process or a T-die method may be used for the embossing film 22 and a base film 24.
[0041] The top film 23 has fire retardancy, and if it is the film or sheet which can carry out heat weld, sticking it by pressure with the embossing film 22, it will not have especially a limit. Although thickness can be suitably chosen according to the quality of the material to be used, the range of 35-50 micrometers is usually especially desirable 10-100 micrometers. The top film 23 could be fabricated by any of a tubular film process or a T-die method. A top film can choose suitably a film, a sheet, etc. which consist of resin which has fire retardancy, such as thermoplastics and thermosetting resin, for example including the polyethylene constituent concerned.
[0042] As for the fire-resistant cellularity buffer sheet of this invention, both the embossing film 22 the top film 23 and the base film 24 may use the multilayer film not only the film of one layer but more than two-layer. However, after forming much embossing, it is the film with which the air omission of embossing does not happen.
[0043] Although the configuration of embossing is mainly a cylinder, it can be made into multiple frustums, such as multiple drills, such as multiple columns, such as the triangle pole, a prism, a pentagonal prism, and a hexagonal prism, a cone, a triangular pyramid, a pyramid, a pentagonal pyramid, and a hexagon-head drill, a truncated cone, a triangular pyramid base, a truncated pyramid, five truncated pyramids, and a hexagon-head frustum, a semi-sphere, an egg shape, a spheroid, etc. Moreover, two or more these configurations may be combined.
[0044] As for the height of embossing, it is desirable that it is the range of 2 1-20mm and the

area of base of 0.1-1.5cm. Moreover, embossing is spacing of the range of 0.5-20mm, and it is desirable the whole surface of the embossing film 22 or to be arranged mostly on the whole surface.

[0045] As a desirable mode of the manufacture approach of the fire-resistant cellularity buffer sheet of this invention, embossing 21 is formed on (1) embossing film 22, and it is manufactured at formation, the coincidence, or the process of carrying out heat weld and forming the cellular section 3 on the embossing film 22 after that, rolling a base film 24 almost and sticking the embossing film 22 and a base film 24 by pressure on (3) embossing rolls of the (2) embossing 21.

[0046] An example of a still more concrete manufacturing method is explained using drawing 3. Drawing 3 explains the process which manufactures the buffer sheet 1 from film 22' (embossing film before embossing formation), and a base film 24. Film 22' and the base film 24 which are used here may be a tubular blown film original fabric, and a T die film original fabric may be used for them instead of a tubular blown film original fabric. In addition, a tubular blown film is fabricated by the film forming cycle shown in drawing 4.

[0047] Before film 22' before becoming the embossing film 22 on the other hand is sent to an embossing roll 109, it is desirable that a preheating is carried out. For example, like drawing 3, via a roll 106, a preheating is carried out with a heating roller 107, and it is sent to an embossing roll 109 via a roll 108. Although the temperature of a heating roller 107 should just be maintained at the temperature of 280 degrees C or less more than the softening temperature of the embossing film 22, the desirable range is more than the softening temperature of the embossing film 22, and is range below temperature higher 100 degrees C than the melting point. Although the number of heating rollers 107 may be one, it is desirable to make it two or more pieces so that a preheating can fully be carried out, and it is still more desirable to make it three pieces practical.

[0048] Before being sent to an embossing roll 109, as for a base film 24, it is desirable that a preheating is carried out, for example, the preheating of it is carried out with a heating roller 120 via a roll 119, and it is sent to an embossing roll 109. Although the temperature of a heating roller 120 should just be maintained more than the softening temperature of a base film 24, the desirable range is more than the softening temperature of a base film 24, and is range below temperature higher 50 degrees C than the melting point. Although the number of rolls of a heating roller 120 may be one, it is desirable the two or more numbers and to make it three practical so that a preheating can fully be carried out.

[0049] drawing in with the degree of vacuum of 40-100hPa with a vacuum pump by the embossing roll 109, heating film 22' before embossing formation -- embossing 21 -- film 22' -- a large number are formed upwards and it considers as the embossing film 22. Sticking the embossing film 22 and a base film 24 by pressure with the sticking-by-pressure roll 121, heat weld is carried out on an embossing roll 109, and the cellular section 3 is formed. Subsequently, with a cooling roller 111, it cools being stuck to an embossing roll 109 by pressure, and the buffer sheet 6 is formed. The buffer sheet 6 formed with the embossing roll 109 is fully further cooled via a roll 112.

[0050] Here, since the embossing 21 of the embossing film 22 will not be formed good if the temperature of an embossing roll 109 exceeds 280 degrees C, the temperature of an embossing roll 109 is 280 degrees C or less, and is usually heated below at the melting point of this film. From the configuration of embossing etc., the desirable range is below the melting point of this film, is beyond temperature lower 60 degrees C than the melting point, is below still more desirable temperature lower 10 degrees C than the melting point of this film, and is beyond temperature lower 40 degrees C than the melting point.

[0051] Moreover, the tubular blown film original fabric which may be used by the production process of drawing 3 is fabricated by the tubular blown film forming cycle shown in drawing 4. In drawing 4, raw material resin is extruded from an extruder to a dice 201 in the state of the melting resin fused with heat. By blowing and carrying out air cooling of the air from the lower part of a dice 201, fabricate the tube-like film 2 and a film 2 is made into Taira and others with a baffle plate 401 and Rolls 101a and 101b. Via a roll 102, a film 2 is divided into film 2a and film 2b by the slit cutter 402, respectively, and roll 103a and film 2b are respectively rolled round for film

2a by the reel as an original fabric via roll 103b. As for the temperature of dice 201 outlet, it is desirable that it is 150-210 degrees C.
[0052] Drawing 5 explains the process which manufactures the buffer sheet 6 using film 22' and the base film 24 which are manufactured by T die film shaping Rhine. Film 22' is extruded from T die 202, and a base film 24 is extruded from T die 203, and is respectively sent to an embossing roll 109. As for the temperature of T die 202 and 203 outlets, it is desirable that it is usually 210-250 degrees C, and is 230-250 degrees C practical.
[0053] In an embossing roll 109, by the same approach as the case of drawing 3 , embossing 21 is formed and the cellular section 3 is formed from the embossing film 22 and a base film 24. Subsequently, it cools being stuck to an embossing roll 109 by pressure with a cooling roller 111, and the buffer sheet 6 is formed. The temperature of an embossing roll 109 is the same as the case of drawing 5 . As for a cooling roller 111, it is desirable to make a part of cooling water immersed in a roll 111, and to be cooled. The buffer sheet 6 formed with the embossing roll 109 is fully further cooled via a cooling roller 112. Moreover, a film may be supplied in the form of an original fabric to either the part from T die 202 of drawing 5 to an embossing roll 109, or the part from T die 203 to an embossing roll 109, and may be sent to it via a heating roller at an embossing roll.
[0054] Drawing 6 explains another desirable mode of the manufacture approach of the fire-resistant cellularity buffer sheet of this invention. First, after manufacturing the cellular section 3 like the above-mentioned, (1) top film 23 is almost rolled so that embossing or the height of the embossing film 22 may be contacted, and the buffer sheet 7 of drawing 2 can be manufactured according to the process of carrying out heat weld, sticking embossing or a height, and the top film 23 by pressure on (2) sticking-by-pressure roll.
[0055] Drawing 6 is explained as one still more concrete embodiment. Drawing 6 shows the process which sticks the top film 23 and manufactures the buffer sheet 7 to the buffer sheet 6. Via a roll 115, the preheating of the top film 23 is carried out with a heating roller 116, and it is sent to a heating roller 118. Although the temperature of a heating roller 116 is maintained more than the softening temperature of the top film 23, the desirable range is more than the softening temperature of the top film 23, and is range below temperature higher 10 degrees C than the melting point. Although the number of rolls of a heating roller 116 may not be one, it is desirable to make it three so that a preheating can fully be carried out. On the other hand, before the buffer sheet 6 is sent to a heating roller 118 and the sticking-by-pressure roll 114, it is desirable to become hot beforehand.
[0056] In the manufacture approach of the fire-resistant cellularity buffer sheet of this invention shown in drawing 3 and drawing 5 , since the conditions 70-110 degrees C and whose seal rolls 121 110-150 degrees C and an embossing roll 109 are [a shaping rate / a part for part further 2-40m/for /and 1-60m embossing side heating roller temperature 107] 60-90 degrees C for 130-200 degrees C and base side heating roller temperature can manufacture continuously, without applying a load to a making machine, they are desirable.
[0057] The fire-resistant cellularity buffer sheet of this invention can be used for the application which needs fire retardancy, such as a building use and a building application, for example, can be used for the tile exfoliation prevention construction approach, the aeration structure, the ventilation structure of a building, etc.
[0058]
[Example] Although an example and the example of a comparison are given and this invention is explained hereafter, this invention is not limited only to these examples.
[0059] The property of the (A) ethylene-alpha olefin copolymer which constitutes the plastic film used by this invention was searched for with the following measuring method, and was shown in Table 1.
[1] Consistency (g/cm3) : JIS Based on K7112, the strand obtained at the time of MI measurement in 190-degree C 2.16kg load was heat-treated at 100 degrees C for 1 hour, and the sample annealed to the room temperature over 1 hour was measured using density gradient tubing.
[2] Melt flow rate (MI): JIS It asked by measuring the weight of the resin extruded in the shape

of a strand using a melt indexer in [in 2.16kg load in 190 degrees C] 10 minutes based on K7210.

[0060] The property and moldability of a cellular buffer sheet which were obtained were evaluated according to the approach shown below, and showed the result in Table 3.

[0061] - Appraisal method (1) tearing strength of the property of a cellular buffer sheet (Kgf) : ASTM It carried out according to D1922.

[0062] (2) Dirt impact strength (gf / 26 inches) : it is JIS to the heights (embossing section) of a cellular buffer sheet. According to K1702, dirt was dropped from 26 inch height and the fall load when heights (embossing section) break was made into cap impact strength.

[0063] (3) It is ASTM about the coefficient of static friction and dynamic friction coefficient of coefficient-of-friction sheet heights and the sheet flat-surface section. It carried out according to D1894.

[0064] (4) Oxygen index : JIS It carried out according to K7201.

[0065] (Examples 1-3) What carried out film shaping of the polyethylene constituent which mixed beforehand each component shown in Table 2 to homogeneity with dryblend was used for the embossing film and the base film. The buffer sheet was manufactured with the film method shown in drawing 3 . For the heating roller, the range of 110-150 degrees C and an embossing roll were [the range of 70-110 degrees C and the cooling roller of manufacture conditions] parts for 2-4m/in the range of 60-90 degrees C, and rolling-up rate the 130-200-degree C range and base film side the embossing film side. The obtained buffer sheet evaluated physical properties and showed the result in Table 3. As for all the obtained buffer sheets, the oxygen index showed fire retardancy or more by 22. The ethylene-alpha olefin copolymer manufactured by the fluidized bed gaseous-phase method using the metallocene catalyst which is a single site catalyst system was used for the ethylene-alpha olefin copolymer.

[0066] (Example 1 of a comparison) What carried out film shaping of the polyethylene constituent which mixed beforehand each component shown in Table 2 to homogeneity with dryblend was used for the embossing film and the base film. the film method shown in drawing 3 -- as manufacture conditions, the embossing film side, the 130-200-degree C range and base film side, the range of 110-150 degrees C and an embossing roll performed the range of 70-110 degrees C by part for 2-4m/in the range of 60-90 degrees C, and rolling-up rate, and the cooling roller manufactured [the heating roller] the buffer sheet. At the time of manufacture, since a film was not extended but was cut between a heating roller and an embossing roll, a buffer sheet was not able to be manufactured continuously. Furthermore, on the embossing roll, the obtained buffer sheet had the bad mileage of a film, and since the vacuum forming was difficult, the configuration of embossing was bad [the sheet].

[0067]

[Table 1]

（1）エチレン－α－オレフィン共重合体

	密度 (g/cm^3)	MI (g/10min)	α-オレフィン
ポリエチレンA1	0.920	4	ヘキセン-1
ポリエチレンA2	0.904	4	ヘキセン-1

[0068]

[Table 2]

	実施例１	実施例２	実施例３	比較例１
エチレン－α－オレフィン共重合体重量部	ポリエチレンA1 100	ポリエチレンA1 100	ポリエチレンA2 100	－
LDPE[1] 重量部	－	－	－	100
金属水和物重量部	水酸化マグネシウム[2] 58	水酸化マグネシウム[2] 87	水酸化マグネシウム[2] 87	水酸化マグネシウム[2] 58
エチレン系重合体重量部	EEA[3] 35	EEA[3] 53	EEA[3] 53	EEA[3] 35
変成ポリエチレン重量部	MAH-PE[4] 7	MAH-PE[4] 11	MAH-PE[4] 11	MAH-PE[4] 7

１）低密度ポリエチレン：密度（0.928g/cm^3），MI（1.0g/10分）．
２）協和化学社製　高純度水酸化マグネシウム．
３）エチレンアクリル酸エチル共重合体：MI（0.5g/10分），アクリル酸エチル含有量25mt%．
４）無水マレイン酸変性ポリエチレン：MI（1.5g/10分），

[0069]
[Table 3]
気泡性緩衝シートの物性

		単位	実施例１	実施例２	実施例３
膜厚（平均）	シール部	μm	111	124	93
	エンボス部		36	40	27
	ベース部		16	19	18
引裂強度	MD	Kgf	2.0	2.1	1.4
	TD	Kgf	2.0	2.3	1.9
摩擦係数（静摩擦/動摩擦）	MD	－	0.2/0.2	0.2/0.2	0.2/0.2
	TD	－	0.2/0.2	0.3/0.3	0.2/0.2
酸素指数		－	22	23	22
ダート衝撃強度	エンボス部	g f/26インチ	147	135	122

[0070]
[Effect of the Invention] The ethylene-alpha olefin copolymer is used for the cellular buffer sheet of this invention as a base polymer, and it is excellent in fire retardancy, and coefficient of friction is small, it excels in mechanical properties, such as tearing strength and impact strength, and a cellular buffer sheet is obtained. Furthermore, since the halogen system flame retarder is not included, even if it burns, the cellular buffer sheet which a toxic gas hardly generates is obtained.

[Translation done.]